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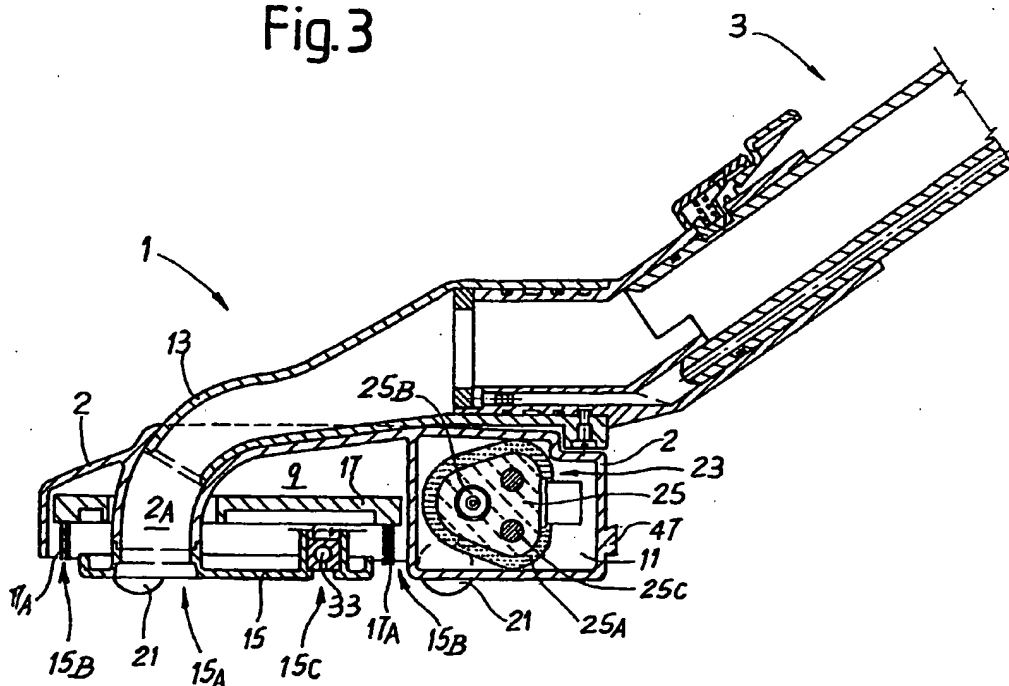
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(54) A mop for cleaning floors and/or carpets, equipped with a suction device and a device for generating and distributing steam

(57) The mop or broom consists of an operating head (1) furnished underneath with a suction hole (15A), at least one steam distribution hole (15C) and a retractable brush (17A). The steam generating device (23) is

housed in the operating head (1) and, via a feed pump, receives water for vaporising, the latter being contained in a tank in the body which is joined to the manoeuvring shaft (3) of the mop. A removable cloth-holding device can be applied to the head (1).

Fig. 3



EP 1 027 855 A2

## Description

[0001] There already exist portable devices for cleaning floors and carpets, which, in addition to the action of a brush - sometimes motorised and rotating - also have a suction system for removing dust. These devices, which are known as electric brooms, carpet beaters etc., carry out an initial cleaning by removing the dust that has deposited, but fail to dislodge the dirt that has adhered to the surfaces in question. To this end, other devices have been invented which involve emitting steam through the operating head. This steam may be produced in a generator separate from the apparatus and connected to the head via flexible tubing, or in a body applied to the manoeuvring shaft. In these devices the steam, which for safety reasons is produced at room pressure, passing through and touching the colder feeder pipe that connects the generator to the steam distribution holes and which is extremely long, condenses for the most part and reaches the surfaces to be cleaned largely as hot water, with a reduced cleaning and disinfecting effect. Furthermore, the steam generator, which is normally a metal structure, weighs down the manoeuvring shaft of the apparatus, whereof in the said patent request, thereby tiring out the operator.

[0002] This invention refers to a mop equipped with a suction device and a device for generating and distributing steam. The mop consists of an operating head, to which a hollow manoeuvring shaft is applied; the latter has a body positioned mid-way, which encloses an aspirator equipped with a device for collecting the sucked-up water and a water-tank for feeding a steam generator, via a pump. According to the invention, said steam-generating device is housed in the operating head and receives from said tank - via a conduit - the water for vaporising. With such a lay-out, the one or more holes for distributing the steam are located practically at the point where the steam exits the generator. Therefore, without condensing, the steam arrives at 100°C on the surface to be cleaned, where it now condenses, heating the surface and turning the dirt into liquid or removing it, with excellent cleaning and sterilising effects. The water that condenses on the surface to be cleaned is therefore removed together with the dirt, by means of said suction hole. Furthermore, with said device, the steam generator does not weigh down the manoeuvring shaft of the mop unnecessarily, to the benefit of the operator.

[0003] According to the invention, a removable cloth-holder can be applied to the operating head. In this way, the apparatus can be used for steam distribution either with its own brush or with a cloth, having first stowed the brush inside the operating head in the usual way and applying the cloth-holder.

[0004] In the favoured version of the invention, the steam generator includes a body with an elongated shape made from good heat-conducting metal (for example, aluminium) and has a first cavity extending lengthwise. Said cavity is connected at one end to the

conduit that comes from said feeder pump for the water and, at the other end, by means of a tube several centimetres in length, to the steam distribution holes underneath the operating head. Furthermore, the generator includes at least one second cavity, located near to said first cavity, designed to house an electrical heating element, electrically isolated from said metal body, and which can be brought to a temperature higher than the boiling point of water. In such a way, given the proximity and the good conductivity of the material, the walls of said first cavity will reach a more or less uniform temperature, similar to that of the heating element, in such a way that the water which passes through it will be completely vaporised in the cavity itself. At least one heat sensor is applied to the metal body in order to regulate, by means of a control circuit, the voltage of said element. Likewise, a second heat sensor is applied to the steam generator, on the basis of which, the pump for feeding water to the generator is activated only at the moment in which the generator temperature has passed a predetermined threshold, so as to avoid spreading non-vaporised water all over the floor.

[0005] Said heating element may be an electrical resistance or, preferably, a thermistor of the PTC type, for a more efficient temperature control.

[0006] In a preferable version, the cloth-holder device includes a layered rigid support, furnished on the upper part with expanders for gripping - possibly with springs - appropriate projections on the operating head, once the brush has been lifted and stowed inside and said support replaces it beneath the head. Said support has slits in correspondence with the steam suction and distribution holes in the head. Along the two parallel sides of the support there are flaps for inserting into respective pockets in a cloth when it is fastened under the head. These flaps are preferably hinged along said parallel sides of the support and pulled downwards by respective springs, to make it easier to insert the cloth and stretch it out when the mop is applied to the dirty surface. In this way, the mop can be used for steam-cleaning floor and carpet surfaces of the dirt which they have accumulated. The cloths can be made of absorbent disposable material, paper rather than fabric.

[0007] The design, which is not binding, shows one version of the model and, in particular:

Fig. 1 shows a side view of a mop according to the invention, partially in cross-section;

Fig. 2 shows an enlarged lay-out of the operating head of the mop in Fig. 1;

Figs 3 and 4 each show a side view of the operating head of the mop in Fig. 2, the head in Fig. 3 being seen in cross-section according to a vertical plane along III-III in Fig. 2;

Fig. 5 shows a perspective view of the mop head with a cloth-holder device and cloth applied;

Figs 6 and 7 each show a perspective view of a cloth-holder device and cloth to be applied to the

head in Fig. 5; and

Fig. 8 shows an enlarged view of a detail from Fig. 1.

[0008] According to the invention, the mop consists of an operating head 1 (Fig. 1) to which is joined a manoeuvring shaft 3, and a central body 5 equipped with handle, located about mid-way up the shaft 3 and joined to it.

[0009] The operating head 1 has a box-like structure 2 with a flat shape and rounded corners, which contains a forward cavity 9, open downwards, and a rear housing 11 which extends at right angles to the mop. In the central part of the forward cavity, the structure has a tubular space 2A which is arched so as to accommodate the curved end 13 of the manoeuvring shaft 3, in such a way as to permit the said shaft 3 to be inclined with respect to the head and the floor, from the extremely acute angle in Fig. 3 to the extremely wide angle in Fig. 4, according to choice.

[0010] The lower end of said tubular space 2A ends at the level of a suction hole 15A in a lower front panel 15; the panel 15 is connected to the structure 2 by means of spacers (not shown in the diagram) and defines - with its outline and the opening of the forward cavity 9 - a circular gap 15B. The cavity 9 houses a brush 17 (Fig. 3) with bristles 17A, which extends around and inside said gap 15B. The brush 17 is joined to the box-like structure in the usual way, so that, by activating a manual command 19, it assumes a raised position (as in Fig. 3) with the bristles drawn into the structure 2, or a lowered position (as in Fig. 4) with the bristles protruding from below the panel 15. The head 1 is equipped with wheels 21 to facilitate movement across the surfaces to be cleaned.

[0011] The housing 11 of the head 1 contains a steam generator 23, formed by a metal cylinder body 25, with triangular cross-section and rounded corners, said body extending at right angles to the mop and covered with a layer 25A of non-conducting material. The body 25 has a through hole 25B and two blind holes 25C, said holes having axes parallel to one another and to the rulings on the cylindrical surface of the body 25. Electrical resistances 27 are inserted and glued tightly inside the respective holes 25C, and heat sensors 28 are fixed to the body 25 for the purpose of monitoring said resistances 27 by means of a control circuit, not shown in the drawing, to keep the temperature of the body 25 at a pre-established level. The ends of the hole 25B are connected by joints, one to a tube 29 for feeding water from the central body 5 and the other to a short tube 31 connected to a distributor 33 furnished on the under side with steam distribution holes. The distributor 33 is inserted within the panel 15 at the level of the holes 15C (Fig. 3), to enable the steam to be directed onto the surface to be cleaned.

[0012] The central body 5 (Fig. 1) has a long tapering form and includes a casing 5A with a handle 5B and, at the ends of the body, seatings for, respectively, a lower

segment 3A and an upper segment 3B of the manoeuvring shaft 3. At least the lower segment 3A of the handle is hollow, in such a way as to form a conduit between the lower opening 15A (Fig. 3) of the head 1 and an upper side opening 35A (when the mop is inclined at its most acute angle) of a container 35 in which an aspirator 37, also housed in the body 5, creates a powerful decompression. The steam released from the distributor 33 onto the dirty surface is transformed into water, which the air current generated by the decompression picks up and deposits in the container 35, together with the dirt collected. The body 5 has an opening 5E to allow the removal of the container 35 when it needs emptying. In addition, between the container 35 and the aspirator 37 there is a float valve 39 to prevent the dirty liquid that has been sucked up from overflowing the container 35 and reaching the aspirator 37.

[0013] The body 5 also houses a water tank 41 for the production of steam and a feed pump 43, by which the water is taken from the tank 41 and sent - by means of a small feed tube 29 (see also Fig. 2) - to the steam generator 23.

[0014] Furthermore, the head 1 has two lateral projections 45 (Figs 2, 3, 4 and 5) and a rear projection 47, to which corresponding expansion clips (49, 51) jutting out from the top of a cloth-holder support 53 may be applied (Fig. 6).

[0015] Said support has, hinged along its two parallel sides, lateral flaps 55, stressed by springs 57 to assume the position shown for the left flap in Fig. 6. The flaps are designed to fit into the side pockets 61 (Fig. 7) of a cloth 63, in fabric, felt, paper or other similar material. The support 53 may be fixed under the head 1 using the lateral clips 49 inserted on the projections 45 of the head and the rear clip 51 - which is shown with flexible tooth - spring clipped to the rear projection 47 of the head, and a cloth 63 can easily be applied to the flaps 55 by means of the pockets 61. Placing the head 1 on the surface to be cleaned, the flaps 55 rotate upwards, overcoming the pressure of the springs and stretching the cloth 63 across the lower part of the head 1. In the cloth 63 and the support 53 there are openings 53A and 63A, respectively, at the level of the suction hole 15A in the head 1, and 63B and 53B, at the level of the holes 15C for the steam jets 33 of the head 1. Once the brush 17A has been pulled up into the head 1 and the cloth 63 applied, as described above, this apparatus can be used for steam cleaning floors, carpets etc., with an action that is cleaning, cleansing and sterilising.

[0016] The cloth 63 may be in cheap material, for example paper or fabric, to be disposed of after use.

## Claims

1. A mop or broom for cleaning floors and/or carpets, equipped with a suction device and a device for generating and distributing steam, the mop includes

an operating head (1) with a suction hole (15A) underneath, at least one hole (15C) for distributing steam and a retractable brush (17A), the head being applied to a hollow manoeuvring shaft (3), which, at mid-height, enclosed within a body (5), has an aspirator (37), a tank (35) for collecting the water sucked up and a tank (41) for feeding water via a pump (43) and a conduit (29) to a steam generator, characterised by the fact that said steam generating device (23) is housed in the operating head (1) and that a removable cloth-holding device (53) can be applied to the head (1).

2. Mop according to claim 1, characterised by the fact that said steam generator (23) consists of a metal body (25) with an elongated form and a through cavity (25B) along its length, said cavity being connected at one end to a conduit (29) coming from said feed pump (43) and, at the other, by means of a short tube (31), to steam distribution holes (15C) underneath the operating head (1) for spraying steam onto the surface to be cleaned, and at least one other cavity (25C) for housing an electrical heating element (27), electrically isolated from said metal body (25), with at least one heat sensor (28) being applied to the metal body in order to regulate the temperature, via a control circuit, the voltage being supplied to said element (27) in such a way that the temperature of the body (25) reaches and remains at a pre-established level.
3. Mop according to claim 2, in which said heating element (27) is an electrical resistance.
4. Mop according to claim 2, in which said heating element (27) is a thermistor of the PTC type.
5. Mop as in any of the claims 1-4, characterised by the fact that said cloth-holding device (53) consists of a layered rigid support, equipped with expansion clips (49,51) for gripping - if necessary with spring catches - the appropriate projections (45,47) located on the operating head once said support is applied beneath the head, that said layered support has slot openings (53A,53B) corresponding to the steam suction and distribution holes (15A,15C) in the head (1), and that along the two parallel sides of the layered support there are flaps (55) designed for insertion into respective pockets (61) in a cloth (63) to be applied underneath the head.
6. Mop as in claim 5, characterised by the fact that said flaps (55) are hinged along said opposing sides of the cloth-holding device (53) and that they are pulled downwards by springs (57), to facilitate the insertion of the cloth (63) and its stretching beneath the head (1).

7. Mop as in any of the claims 1 to 5, characterised by the fact that said cloths (63) applied underneath are disposable and made in absorbent, non-fabric material, even paper.

8. A mop for cleaning floors and/or carpets equipped with a suction device and a device for generating and distributing steam; the whole being as it is described and illustrated above.

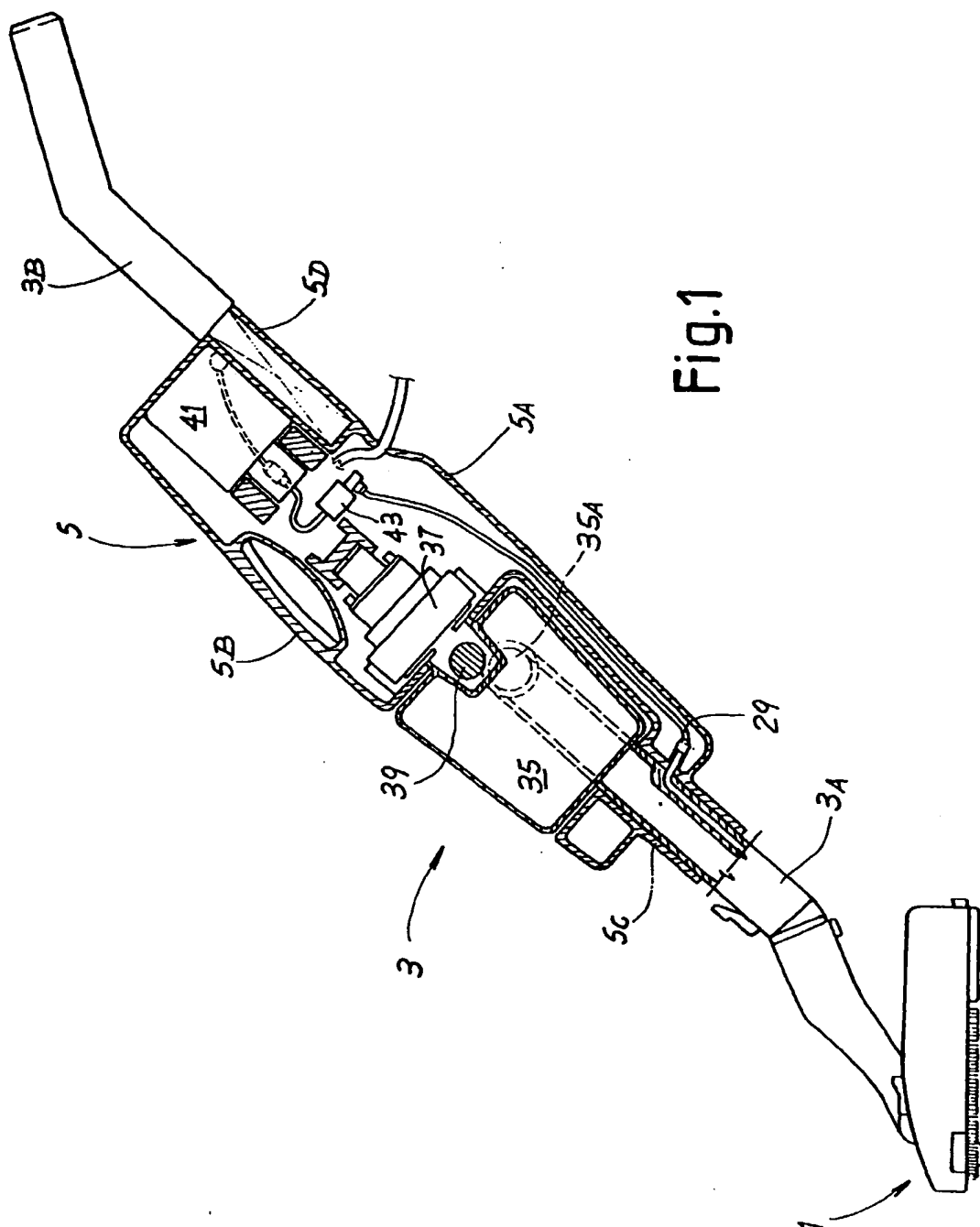


Fig.2

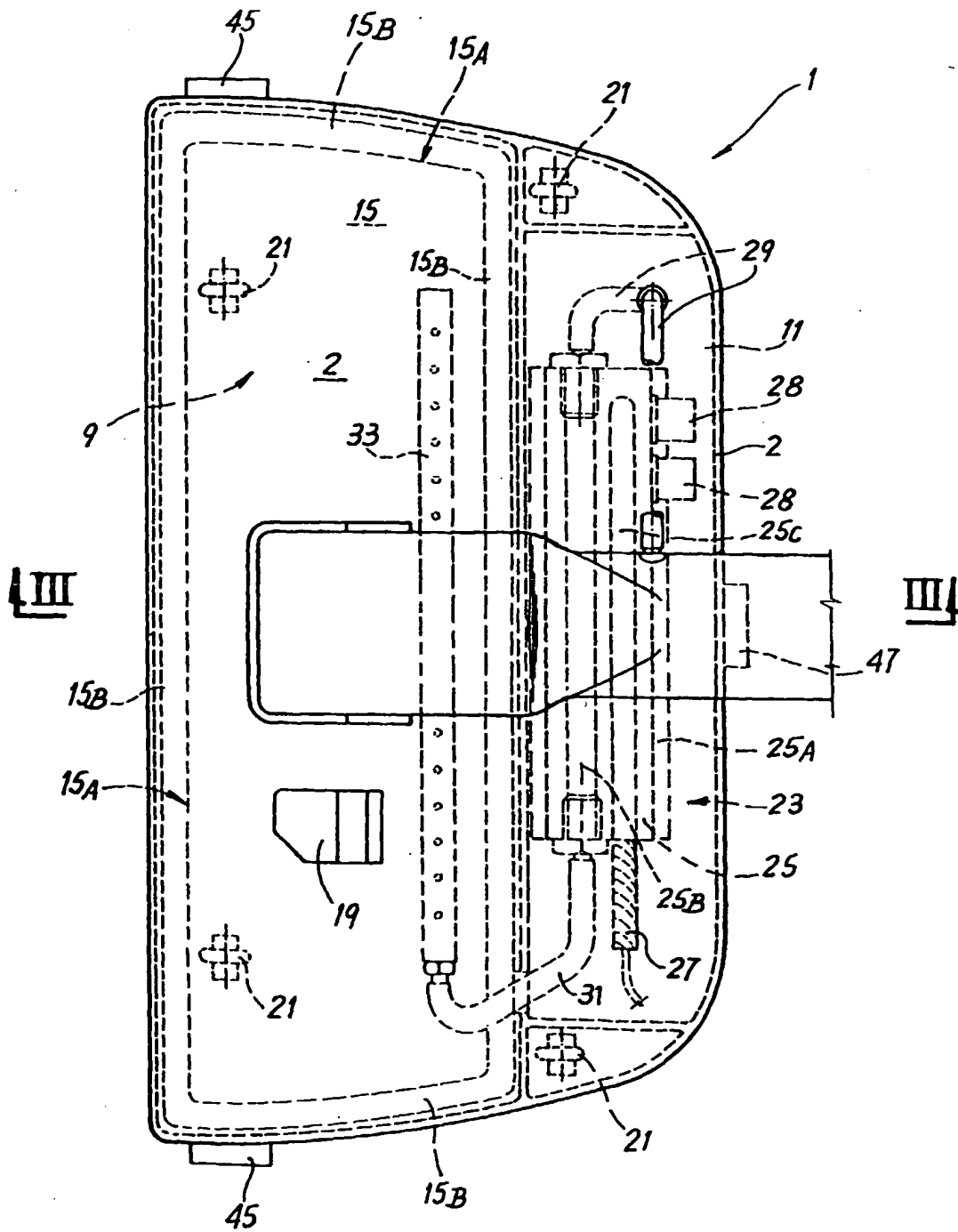


Fig.3

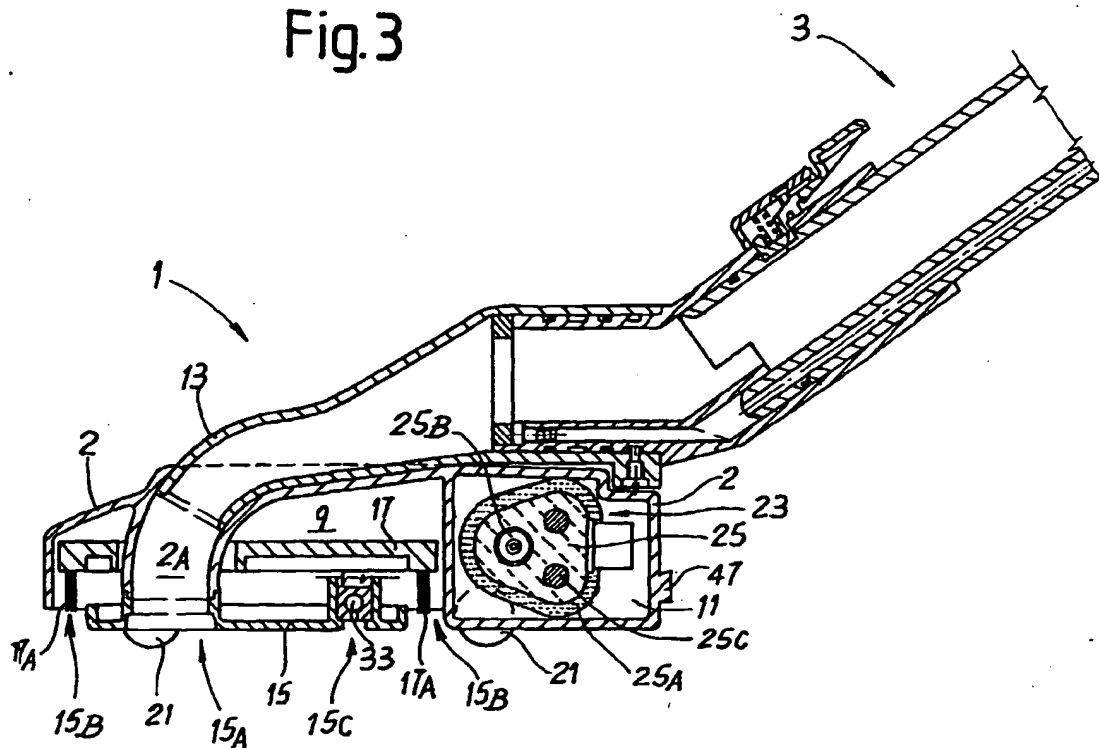


Fig.4

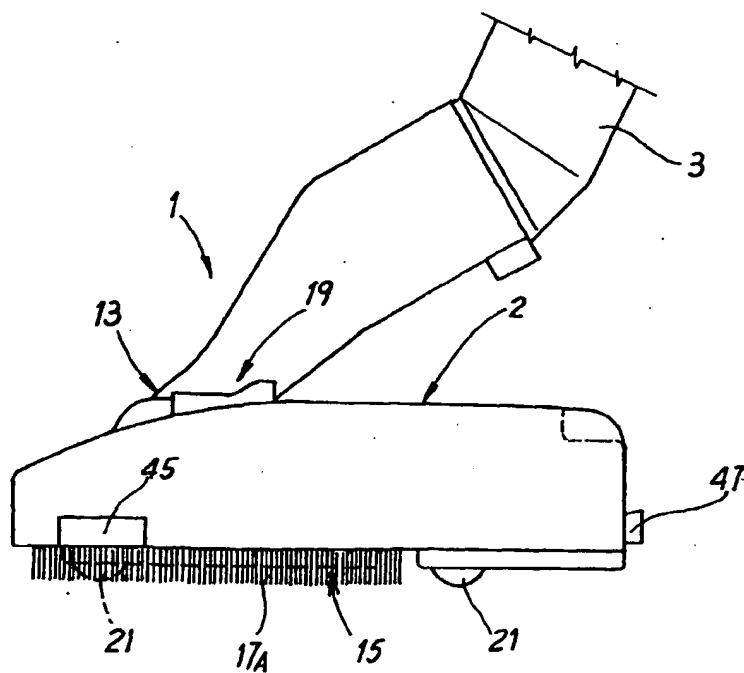


Fig. 5

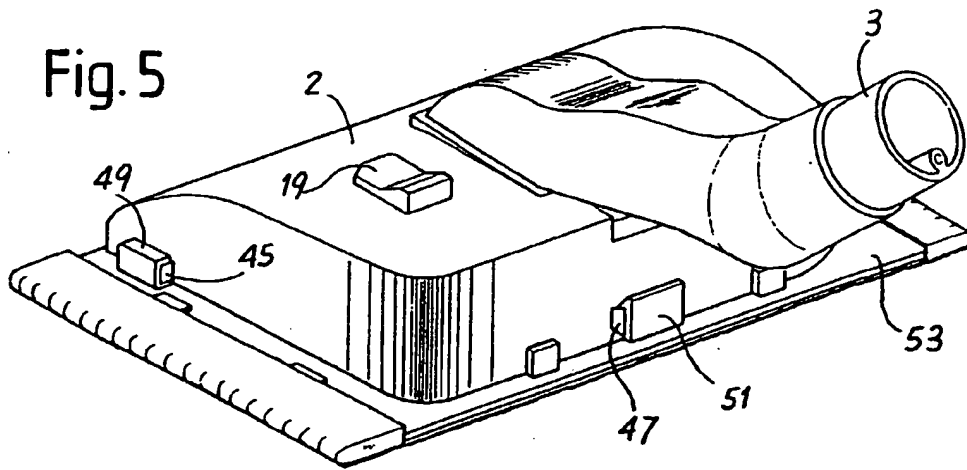


Fig. 6

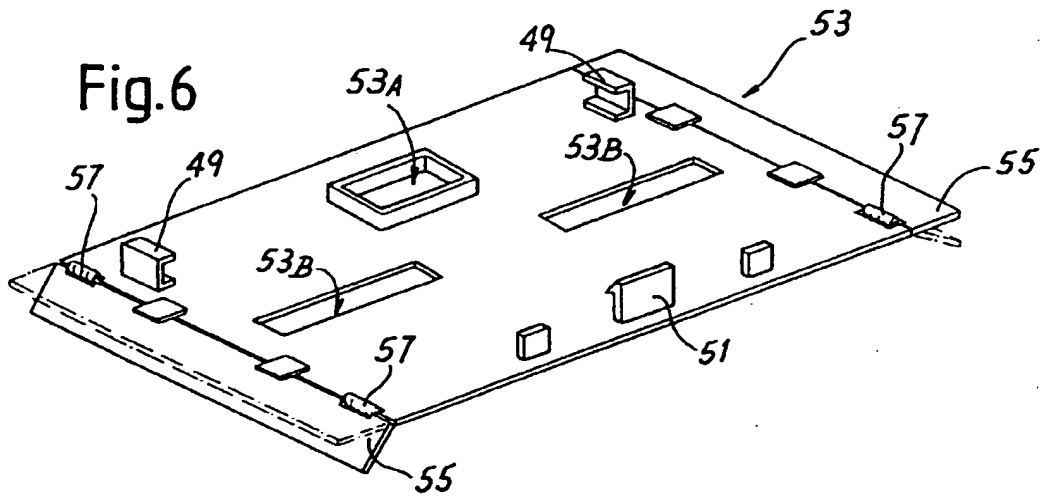


Fig. 7

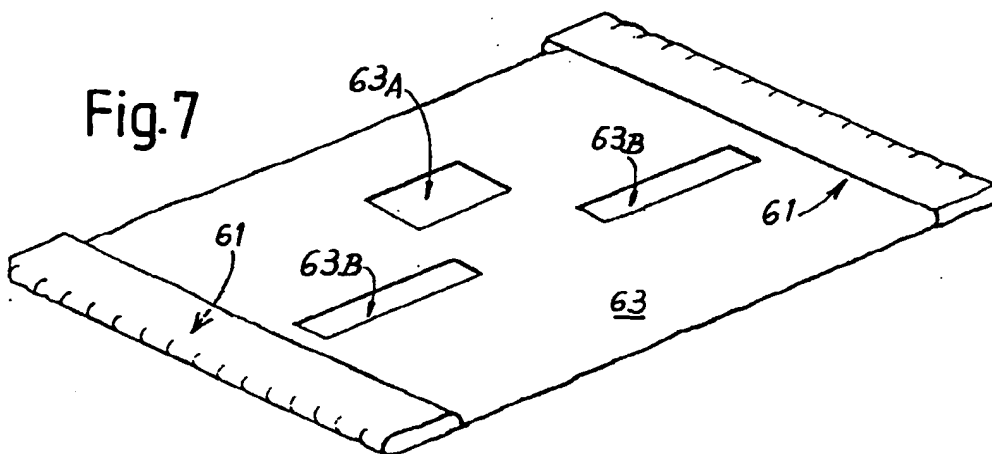




Fig. 8

